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WAIS: WIDE AREA INFORMATION SERVERS

by Brewster Kahle

WAIS, the Wide Area Information Servers system, is an electronic publishing software set which allows you to search out and retrieve multimedia information from databases anywhere in the world. This information can be drawn from data stored on your own desktop, in your organization's mainframe, or in a supercomputer on another continent. WAIS software includes user interfaces for most platforms, and server software that provides automatic indexing of databases.

WAIS was developed by Thinking Machines Corporation of Cambridge, Massachusetts in collaboration with Apple Computer, Inc., Dow Jones & Company, and KPMG Peat Marwick. With over 100 databases and 5,000 users worldwide, WAIS is rapidly becoming a standard for information distribution within the Internet environment. Much of the software is currently available for free use.

What does WAIS do?

WAIS allows multimedia information to be stored anywhere on any platform. Using your interface of choice, WAIS enables you to find personal, corporate, and public information. The information is accessible regardless of format: text, formatted documents, pictures, spreadsheets, graphics, sound, or video.

WAIS recognizes natural language queries—the search and retrieval of relevant

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CSNET: A RETROSPECTIVE

by Charlotte Mooers

On October 1, 1991, the CREN/CSNET network was officially closed down. We asked Charlotte Mooers, formerly of CSNET, to answer the following questions: "Where are the CSNET Info-Server and other services that used to be on CSNET?" and, "What happened to CSNET?"

The first of these questions is of immediate interest to many people who used to use CSNET services, especially those who have email-only access to the Internet; the second is history.

Where are CSNET's On-line Services Now?

CSNET operated on-line services on the hosts of *sh.cs.net* and *relay.cs.net*, which were available to all users of the Internet and connecting networks.

The most important service was the Info-Server, an automatic file server that sent documents by email in response to specially formatted request messages. The most popular document request categories were 'info' (general information), 'rfc' ("Request for Comments" documents from NIC.DDN.MIL), and 'mod.sources' (public domain UNIX software from the 'usenet' newsgroup comp.unix.sources).

The 'info' and 'rfc' request categories are now available on another Info-Server on the NNSC's host, *nnsc.nsf.net*. Other categories available on *nnsc.nsf.net* are 'nsfnet' (general info about the NSFNET), 'internet-drafts' (draft RFCs), 'ietf' (reports from the Internet Engineering Task Force), 'isoc' (general information about the Internet Society), 'resource-guide' (descriptions of Internet resources, such as networks, libraries, databases, and information centers), and the 'internet tour' program for the Macintosh.

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WAIS

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information is made using your native language. To date, we have used English, French, Italian, and Latin! The most relevant documents, regardless of size, can be sent back to the server in their entirety to further refine your search (telling the server, "Find me more like this document.") Proven searches can be automatically repeated, monitoring and alerting you to new information as it becomes available.

How does WAIS work?

WAIS uses a single computer-to-computer protocol (NISO Z39.50). Each WAIS server reads your question and based on its words, searches the full text of the database for the most relevant documents, and ranks them using automatic word weighting. Servers need not "fully understand" your query; the retrieval process is based on a search method called "relevance feedback." Thinking Machines provides an implementation of Z39.50 to help vendors develop interfaces and servers.

What WAIS servers exist?

After six months of development, there are over 100 servers on the Internet. More than 5,000 people have used WAIS in 20 countries.

- On one of its Connection Machine supercomputers tied to Internet, Thinking Machines maintains a number of free databases.
- MIT supports a poetry server with classical and modern poetry.
- Cosmic is serving descriptions of government software packages.
- The Library of Congress has plans to make their catalog available via the protocol.
- Weather maps and forecasts are made available by Thinking Machines.
- The "directory of servers" facility is operated by Thinking Machines; it registers, lists, and describes the information available on each server, including any fees for its use.
- Dow Jones will have a server available on their DowVision network that will contain several months of the Wall Street Journal and 450 business publications, and will be a for-pay server.

How can I find out more about WAIS?

- You can try a simple interface by telnet to *quake.think.com*, login "wais".
- FTP the free software from *think.com* in the /wais directory.
- FTP a bibliography: /pub/wais/wais-discussion/bibliography.txt from *quake.think.com*
- Subscribe to *wais-discussion-request@think.com*, a biweekly email list on electronic publishing issues and WAIS releases

For more information on WAIS, send email to Brewster Kahle *brewster@think.com* or Barbara Lincoln *barbara@think.com*, or call Thinking Machines Corporation (415) 329-9300.

The NNSC is currently developing a new screen-based interface for the WAIS system, which will run on dumb terminals and over telnet sessions. The test version of the interface can be accessed by telneting to *nnsc.nsf.net* and logging in with the user name *wais*.

Please send your comments about the new interface to *nnsc@nnsc.nsf.net*. ■

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Three popular email-based services on *sh.cs.net* are no longer available, but the NNSC staff plans to restore them in the near future. These are the 'mod-sources' request category on the Info-Server, and two programs that aided users in dealing with Internet domains: 'fixaddr' accepted lists of outdated email addresses, checked them, and returned the up-to-date domain-style addresses. 'ns-lookup' verified domain names or IP hostnames, using an Internet Domain Name Server, and returned all domain nameserver records. A service which will probably not be restored is the User NameServer, a directory of users with access to the Internet by email. It had a relatively small database of 1,700 names.

For more information about the NNSC Info-Server, send an email message to *info-server@nnsc.nsf.net*, with the following text in the body of the message:

Request: info
Topic: help

What Happened to CSNET?

CSNET, the Computer Science Network, was founded in 1982 with a start-up grant from the National Science Foundation. Its purpose was to open up the ARPANET (the predecessor to the Internet) to academic and commercial sites that were not DoD contractors. CSNET soon became self-supporting on the basis of a graduated system of membership dues.

CSNET was organized as a project of the University Corportation of Atmospheric Research (UCAR), Boulder, Colorado, a non-profit organization funded by the National Science Foundation, with the advice of a Board of Trustees. The Board selected Bolt Beranek and Newman Inc. to run CSNET. The first manager was Richard Edmiston, who had a staff of two, Daniel Long, Technical Liaison, and Laura Breeden, User Liaison.

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CSNET

(Cont. from p.2)

Originally, membership in CSNET was limited to computer science departments of colleges and universities, or to commercial sites with computer-based businesses. Later, this rule was relaxed, and CSNET became "the Computer+Science Network."

The type of connection originally offered was email, over dial-up public telephone lines. This was PhoneNet. It used new software named MMDF (memo message delivery facility), which made it possible for a relay host (CSNET-RELAY, later known as RELAY.CS.NET) to relay messages from CSNET client sites to each other and to the ARPANET. CSNET client sites mostly used DEC VAXes, running either UNIX or VMS operating system, but the PhoneNet software was also adapted to operating systems of Hewlett-Packard, Prime, AT&T, and other manufacturers.

The ARPANET ran over 56KB lines in those days, and PhoneNet used 1200 and sometimes 300-bps connections. Later, newer modems allowed 2400 bps. CSNET introduced a new service, X25net, which ran ARPANET protocols over X.25 networks, and allowed the use of full TCP/IP functionality. This was used over public data X.25 networks. CSNET also ran an experimental network, called Cypress, and developed the dial-up IP program, which is now part of the Berkeley UNIX network release.

Over the years, many CSNET sites made the transition from CSNET to the ARPANET/Internet. These losses to CSNET were offset by new PhoneNet members who were actively recruited by CSNET marketing efforts. At its peak, CSNET had more than 200 members, from all over the United States and in foreign countries.

In 1987 the National Science Foundation (NSF) funded a new high-speed backbone network, the NSFNET, to connect a new group of NSF-funded supercomputing centers, and also to replace the ARPANET. NSFNET member sites were encouraged to organize themselves into self-supporting regional networks.

The formation of the regional networks and the improvements in Internet technology that had occurred during the mid-1980s made it possible and highly desirable for many research and academic organizations to become full Internet sites. CSNET was no longer the most natural path to membership in the Internet, but it was still attracting new members. Thus CSNET seemed relatively stable, and continued to be self-supporting.

At about the same time that CSNET was founded, IBM Corporation set up BITNET, based on IBM technology. This network was restricted to academic institutions. For several years BITNET charged no dues at all, and later, very modest dues. Technical support was provided by volunteers, but after a few years IBM funded a Network Information Center, the BITNIC, with a salaried staff. BITNET expanded greatly during the mid-1980s, but as the various grants from IBM ran out, BITNET was faced with the problem of having to raise member dues.

Looking to the future, the CSNET and BITNET Boards proposed a merger between CSNET and BITNET. The rationale was that CSNET could help the "technically oriented NIC" that many BITNET sites wanted, and could help BITNET adapt their software to be more easily compatible with the Internet. The combined organization was to be called CREN, the Corporation for Research and Educational Networking, and was to be managed by EDUCOM, Princeton, New Jersey, and Washington, D.C., a long-time education consulting firm which already had the contract to run the BITNIC. CREN was to provide financial and accounting management, and to do marketing for all CREN member sites, with additional fees for the physical connections that CSNET supplied to its members.

The CSNET Board, and the BITNET Board and member organizations, voted to merge in October 1988, and the merger became official in October 1989. Mergers frequently have problems, and in this case, expected technical and user services collaboration between the CSNET and BITNET staff never really got started. The efforts to merge the accounting systems proved more difficult than expected, as did the task of having CSNET services marketed by another organization.

What legacy did CSNET leave behind? CSNET helped open up the ARPANET to network technology, and trained the computer science departments of many colleges and universities. As part of that training, CSNET played a major role in the conversion of the ARPANET to the domain name system. Because CSNET PhoneNet sites sent mail to the ARPANET through the buffer of RELAY.CS.NET, the CSNET staff was able to first suggest and then insist that PhoneNet clients select new domain-style names locally when it received its new domain-style names. And if the PhoneNet client was not ready to convert to domain-style names locally when it received its new domain name, RELAY.CS.NET was able to perform the translations automatically, often for a period of months. In many cases, CSNET staff played a key role in getting the parts of an organization who used different networks, and were not in the habit of discussing networks among themselves, to agree on a single domain name.

How to reach the NNSC:
Hotline: (617) 873-3400
Electronic Mail: nnsc@nnsc.nsf.net
U.S. Mail Address:
NSF Network Service Center
Bolt Beranek and Newman Inc.
10 Moulton Street
Cambridge, MA 02138

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CSUNET: THE CALIFORNIA STATE UNIVERSITY NETWORK

by Chris Taylor

CSUnet is a network funded by the state of California in support of educational institutions throughout the entire state, including the twenty campuses of the California State University (CSU). Its basic goal is to provide high-quality access to state, national, and international computing and information resources for all faculty, students, and staff, regardless of their location. CSUnet currently has major nodes in ten of the eleven Local Access and Transport Areas (LATAs) in California.

CSUnet is entirely funded and operated by CSU's systemwide Office of the Chancellor. The statewide network is provided to CSU campuses without cost and to other educational institutions for the basic cost of providing the connection.

Each CSU campus is a major node on CSUnet. Each major node is equipped with a StrataCom fast packet switch, a cisco router, a Telematics X.25 packet switch and 9,600 bps dial-up modems. This equipment is interconnected with frame-relay T-1 circuits. Both data and video are supported.

A growing number of non-CSU sites are also connected to the network. These sites are typically equipped with a cisco router connected to the nearest CSU campus via a 56-Kbps circuit.

Protocols

CSUnet is a multi-data-protocol network. Although TCP/IP is widely used on CSUnet, other popular protocols, such as DECNET, AppleTalk, and X.25, are routed in their native form. In addition, SNA/SDLC is encapsulated within X.25 for delivery across the network. CSUnet carries Group IV facsimile images in support of various inter-library loan activities as well as two-way video for instructional distant learning applications. Four classes between Sacramento and Bakersfield are currently using this capability.

The primary CSUnet Network Operations Center (NOC) is located in Los Alamitos, California, with a secondary NOC in Fullerton, California. NOC support is available 7 days a week, 24 hours a day. All maintenance, configuration, and installation throughout CSUnet is provided centrally by the NOC. The CSUnet Network Information Center (NIC) resides on a DEC VAX 6230 (Internet address

nic.csu.net 130.150.102.20). User documentation and public domain software are available via anonymous FTP.

CSUnet Access Ports (CAPs), 9600 bps V.32 MNP Level 5 dial-up modems, are provided at major CSUnet nodes for the general education community, providing password-protected access to network resources via flexible, user-friendly menus. Current access services supported are X.3 pad (i.e., async terminal) and Internet remote login (Telnet). The CAPs services are unique in that they are entirely network-provided at each major node. No central host support is needed.

CSUnet is connected to a number of external networks, including NSFNET (at both Palo Alto and San Diego), TRT Communications (an international X.25 PDN provider), the Colorado Alliance of Research Libraries, and BITNET. CSUnet has interconnections with two other California mid-level networks, CERFnet and BARRNet.

A number of classes are scheduled to be taught over CSUnet. . . . Beyond the United States and Mexico, CSU Los Angeles and San Diego State University will offer courses involving universities in Argentina, Kenya, and Zimbabwe.

New Members

The newest members of CSUnet are two leading Mexican universities: Centro de Ensenanza Tecnica Y Superior (CETYS) and Tecnologico de Mexicali (ITM). Both universities are members of a new international consortium dubbed "BESTNET" (Bi-national English/Spanish Telecommunications Network). Supported by a $300,000 grant from Digital Equipment Corporation, The BESTNET consortium allows students and faculty of the participating institutions to apply information technology and electronic communication tools to teaching, learning, and research. At the heart of this project is computer conferencing technology that uses DEC VAXnotes distributed across CSUnet and the Internet.

A number of classes are scheduled to be taught over CSUnet. ITM will offer a course in Speech Processing Chips. UC Irvine, CSU Los Angeles and CETYS will collaborate in the delivery of a course in Intercultural Communication. Beyond the United States and Mexico, CSU Los Angeles and San Diego State University will offer courses involving universities in Argentina, Kenya, and Zimbabwe. These universities will access CSUnet via local X.25 PDN facilities, which are connected to CSUnet via TRT Communication's international PDN network.

The resources on CSUnet include:

TRIE: Technology Resources in Education, Los Alamitos. Provides bulletin boards, electronic mail and conferencing to CSU-sponsored K-12 programs. ("atl.calstate.edu")

CSUPER-Net: CSU, Fresno. Electronic Library of admissions information for the California State Universities. ("caticsuf.cati.csufresno.edu")

ATI-NET: CSU, Fresno. Provides information about agricultural research, conferences, and publications of the California Agricultural Technology Institute in CSU, Fresno.

MDL: Molecular Design Center. Allows exploration of molecular structures and properties by computational chemistry students.

AMSPEC: Mainframe specialty center in California Polytechic State University, San Luis Obispo. Provides business and engineering students with experience in IBM operating systems and common business database management systems.

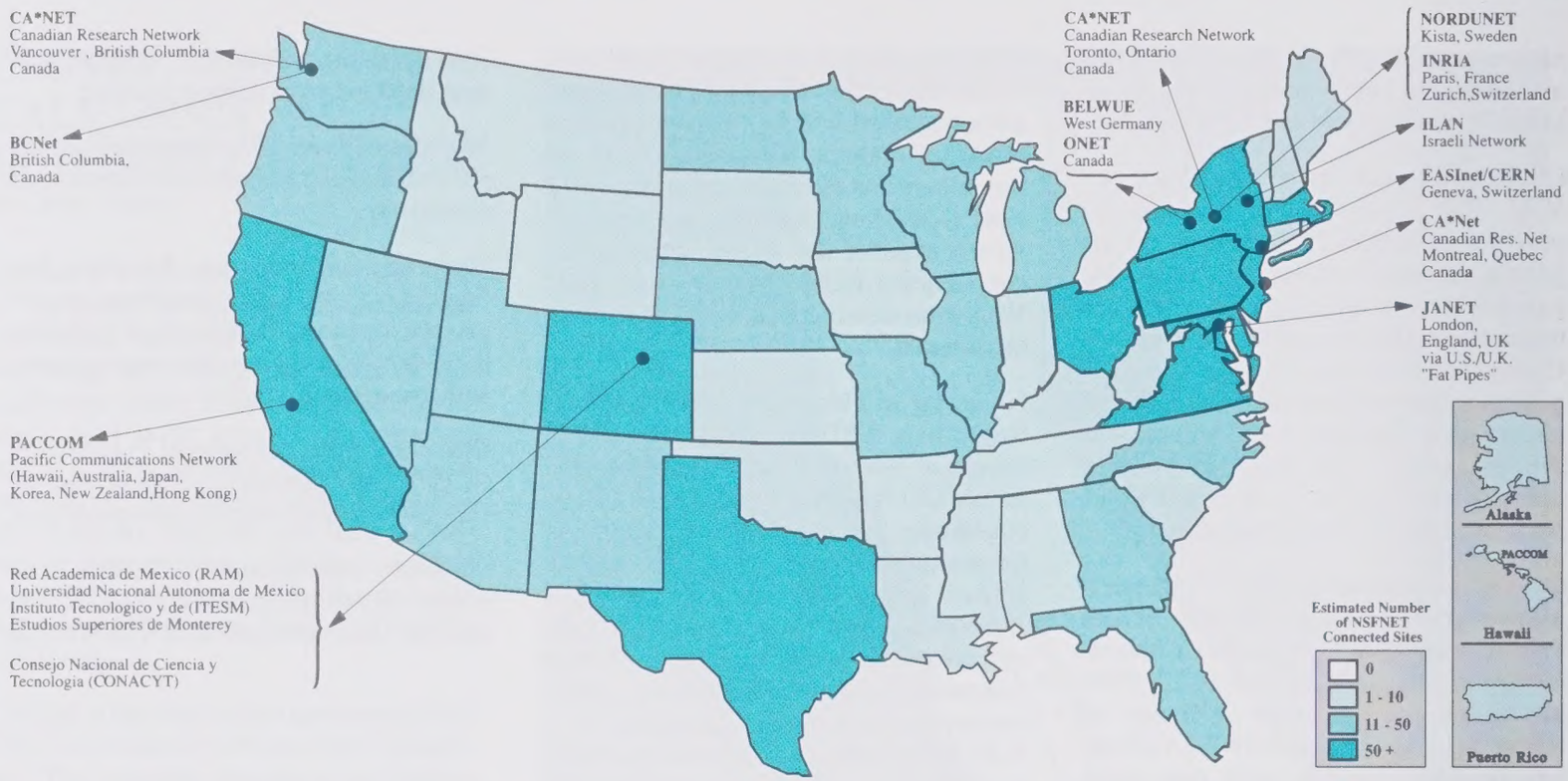
Multiflow Trace: CSU, Sacramento. Supports faculty and students in computational chemistry.

Geographic Information Systems: San Francisco State. Links databases to geographic locations for analysis of problems in urban planning, resource management, and demographic studies.

IBM California Educational Partnerships (ICEP): Los Alamitos. Electronic mail for California school district superintendents.

For more information on CSUnet, send e-mail to *nethelp@calstate.edu* or call CSUnet User Services (310) 985-9661. ■

NETWORKS CONNECTED TO THE NSFNET BACKBONE



STATE	SERVICE PROVIDERS
Alabama	SURAnet
Alaska	NorthWest Net
Arizona	Westnet
Arkansas	MIDnet
California	BARRNet, CERFnet, CSUnet, SDSCnet, Los Nettos
Colorado	CO Supernet, Westnet
Connecticut	NEARnet
Delaware	SURAnet
District of Columbia	SURAnet
Florida	SURAnet
Georgia	SURAnet
Hawaii	PACCOM
Idaho	MIDnet, NorthWestNet, Westnet

STATE	SERVICE PROVIDERS
Illinois	CICNet, INet, netIllinois
Indiana	CICNet
Iowa	CICNet, MIDnet
Kansas	MIDnet
Kentucky	SURAnet
Louisiana	SURAnet
Maine	NEARnet
Maryland	SURAnet
Massachusetts	NEARnet
Michigan	CICNet, Merit/MichNet
Minnesota	CICNet, MRNet
Mississippi	SURAnet
Missouri	MIDnet
Montana	NorthWestNet

STATE	SERVICE PROVIDERS
Nebraska	MIDnet
Nevada	NevadaNet
New Hampshire	NEARnet
New Jersey	JvNCnet
New Mexico	Westnet
New York	NyserNet
North Carolina	CONCERT, SURAnet
North Dakota	NorthWestNet
Ohio	CICNet, PSCnet, OARnet
Oklahoma	MIDnet
Oregon	NorthWestNet
Pennsylvania	PSCNET, PREPnet
Puerto Rico	SURAnet
Rhode Island	NEARnet

STATE	SERVICE PROVIDERS
South Carolina	SURAnet
South Dakota	MIDnet
Tennessee	SURAnet
Texas	SESQUINET, THEnet
Utah	Westnet
Vermont	NEARnet
Virginia	SURAnet, VERnet
Washington	NorthWestNet
West Virginia	PSCnet, SURAnet, WVNET
Wisconsin	CICnet, WiscNet
Wyoming	NorthWestNet, Westnet
National and International Service Providers	
Alternet, ANS, ICM, JvNCnet, PSInet	

1/1992

NSFNET BACKBONE SITES
On-line now (November 1991)
Argonne Nat'l Lab
Cornell Nat'l Supercomputer Facility
Georgia Inst. of Tech.
U. of Maryland
Massachusetts Inst. of Tech.
U. of Michigan
Nat'l Ctr. for Atmospheric Res.
Nat'l Ctr. for Supercomputing Appl.
U. of Nebraska
Pittsburgh Supercomputing Ctr.
Princeton U.
Rice U.
San Diego Supercomputer Ctr.
Stanford U.
U. of Utah
U. of Washington

BARRNet (Bay Area Regional Research Network)
On-line now (November 1991)
Adaptive Corp.
Advanced Decision Systems
Advansoft Research Co.
Amdahl Corp.
Analatom Inc.
Anterior Tech.
Apple Computer Corp.
Auspex, Inc.
Bay Area Air Quality Mgmt. Dist.
Borland International
BTR Communications Co.
California State - Sacramento
Calera Recognition Systems
Canon Info. Systems
CC Mail
Centric Engineering Systems
CGNet Services
cisco Systems, Inc.
Clarity Software
Cohesive Systems
Cornerstone Research
U. of California, Berkeley
U. of California, Davis
U. of California, San Francisco
U. of California, Santa Cruz
Digital Equipment Corp. WRL
EITech
EPRI
ESL Inc.
FMC Inc.
Fujitsu America, Inc.
Genentech
HaL Computer Systems
Hewlett Packard Labs
Highland Software
Hughes LAN Systems
IBM Scientific Ctr.
Innovative Interfaces
Inst. for Global Comm.
Integrated Info. Tech. Inc.
Integrated Systems
Intellicorp
Intelligenetics
Interlink Computer Sciences
Interop Inc.
Intertech Data Systems
Kestrel Institute
Lawrence Berkeley Lab.
Lawrence Livermore Nat'l Lab.
Lexical Technology, Inc.
Loral
Lucid Inc.
MasPar Computer Corp.
Metaphor Computer Systems
Microunity Systems Engineering Inc.
Mills College
MIPS Computer Systems, Inc.
Molecular Research Inst.
Molecular Simulations
Monterey Bay Aquarium Res. Inst.
Mt. Xinu
NASA Ames Research Ctr.
Naval Postgraduate School
NEC America
Netcom
Network Equipment Tech.
NeXT
Nielsen Engineering & Research
NOAA COAP
Novell Inc.
Oracle Corp.
Pacific Bell
Pacific Fisheries Group
U. of the Pacific
Portal Comm.
Price Waterhouse Tech. Ctr.
Quorum Inc.
Rambus Inc.
Ready Systems
Ricoh Corp. Res. Ctr.
Rockwell Science Ctr.
RSA Data Security
SAIC
Sandia Nat'l Labs.
U. of San Francisco
Santa Clara U.
Schlumberger
Silicon Graphics
Silvaco
Software Transformation, Inc.
Sony Microsystems
SRI International
St. Mary's College
Stanford U.
Sun Microsystems
SynOptics Comm. Inc.
T3plus Networking
Tandem Computers Inc.
Teknowledge
Teleos Research
TGV Inc.
Thinking Machines Corp.
3 Com
Toshiba America Med. Imag. Sys.
TRW Financial Systems
Ungermann-Bass Inc.
US Army Corps of Engineers
US Forest Service PSW Res. Sta.
US Geological Survey
Xerox PARC

Expected on-line by May 1992
BASIS
CSI
Foothill-De Anza CC Dist.
Lowell High School
NOARL
San Juan School Dist.
Teale Data Center
Whole Earth Lectronic Link

CERFnet (California Education & Research Federation Network)
On-line now (November 1991)
Able Computer Communications
Adaptive Sensors, Inc.
Advanced Computer Comm.
Advanced Tech. Ctr.
Aerojet
A.G.E.
Agouron Inst.

Applied Neordynamics
Apple Computer
ASJ Support Service, Inc.
Beckman Instruments
Biosym Tech., Inc.
Bray Engineering
Buddhist Computer B. Board
CADAM
California Inst. of Tech.
California Polytechnic State U., Pomona
California Polytechnic State U., San Luis Obispo
CSU,Chancellor's Office SWRL Facility
CSU Bakersfield
CSU Chico
CSU Dominguez Hills
CSU Fresno
CSU Fullerton
CSU Hayward
CSU Humboldt
CSU Long Beach
CSU Los Angeles
CSU Northridge
CSU Sacramento
CSU San Bernardino
CSU San Francisco
CSU San Jose
CSU San Marcos
CSU Sonoma
CSU Stanislaus
U. of CA at Irvine
U. of CA at Los Angeles
U. of CA at Riverside
U. of CA at San Diego
U. of CA at Santa Barbara
U. of CA Office of the President
CBE Technologies, Inc.
Chapman College
Chevron Oil Field Res. Co.
cisco Systems, Inc.
Clinicomp International
CMD Technology
CompuTutor
The Claremont Colleges
Communications Machinery Corp.
Custom Product Design
Dames and Moore
Dataproducts
Dynatem
Emulex Corp.
Excellon Automation
Executive Systems, Inc.
Export-Link Trading Co.
Farallon Computing Inc.
Forte
Fullerton College
Gen-Probe
General Atomics
General Dynamics
Gordian
Hitachi Data Systems
Hughes Aircraft Co.
Intel Corp.
International Chemical Co.
Intevep, S.A. (Caracas, Venezuela)
ISIS Pharmaceuticals
ISX Corp.
ITT Aerospace
Jostens Learning Center
JSOFT, Inc.
LA County Public Library
Litton Data Systems
Loma Linda U.
LSI Logic
Maritime Project
The MAT WEST Co.
MEC Analytical Systems
Micro Technology
Molecular Simulations
NeXt World
Netix
NetLabs
Netrologic
Observatories - Carnegie Inst. of WA
Occidental C.
Open System Consulting
Optigraphics Corp.
Orbit Semiconductor
Pacific Communications Sciences
Pacific Sierra Rsch. Corp.
Pepperdine U.
Qualcomm Inc.
Quotron Systems Inc.
Research Inst. of Scripps Clinic
Resource Strategies, Inc.
Rising Star Research
Salk Inst.
San Diego St. U.
San Diego Supercomputer Ctr.
U. of San Diego
Santa Monica College
Schneider & Koch, Inc.
Science Applications International Corp.
Science Horizons Inc.
Simulation Sciences
South Coast Air Quality Mgmt. District
U. of Southern CA
Sparta, Inc.
Stardent Computer
Structured Systems & Software
Supercomputing Review
Supercomputing Solutions
Systems Engineering Assoc.
Talaris Systems
Tenon
Ultra Systems
U.S. International U.
Unocal Corp.
Walt Disney Software
Walt Disney Imagineering
Way Forward Technology
Whittier Institute
WorldCom
XIRCOM
XLNT Designs
Xerox Corp.
YASCH

CICNet (Committee on Institutional Cooperation)
On-line now (November 1991)
Ameritech Info. Systems
Argonne Nat'l Labs.
Concordia U.
Field Museum of Natural History
U. of Chicago
U. of Illinois at Chicago
U. of Illinois at Urbana - Champaign
Indiana U.
U. of Iowa
Loyola U.
U. of Michigan
Michigan State U.
U. of Minnesota
Northwestern U.
U. of Notre Dame
NOTIS Systems, Inc.
Ohio State U.
U. of Wisconsin - Madison

Expected on-line by May 1992
Share, Inc.

CONCERT (Communications for North Carolina Education, Research, and Technology)
On-line now (November 1991)
Applachian State U.
Bowman-Gray School of Medicine
Chemical Indus. Inst. of Toxocology
Davidson C.
Duke U.
Duke U. Medical Ctr.
East Carolina Medical Ctr.
East Carolina U.
Glaxo, Inc.
IBM Corp. - Cary
IBM Corp. - Res. Triangle Prk.
MCNC Ctr. for Microelectronics
NC A&T St. U.
NC Central U.
NC School of Sci. & Math.
NC State U.
NC Supercomputer Ctr.
Northern Telecom, Inc.
Pembroke St. U.
Res. Triangle Inst.
SAS Institute
Semiconductor Res. Corp.
UNC at Asheville
UNC at Charlotte
UNC at Chapel Hill
UNC Educational Compt. Serv.
UNC at Greensboro
UNC Medical Ctr.
UNC at Wilmington
U.S. Environ. Protection Agency
Wake Forest U.
Western Carolina U.
Winston-Salem St. U.

Expected on-line by May 1992
Elon C.
Chowan C.
Lees-McRae C.
Campbell U.
Meredith C.
Shaw U.
Catawba C.
Queens C.
Mount Olive C.

CSUNet (California State University Network)
On-line now (November 1991)
CA Polytechnic St. U., San Luis Obispo
CA St. Dept. of Education
CA St. Polytechnic U., Pomona
CA St. U., Bakersfield
CA St. U., Chico
CA St. U., Dominguez Hills
CA St. U., Fresno
CA St. U., Fullerton
CA St. U., Hayward
CA St. U., Long Beach
CA St. U., Los Angeles
CA St. U., Northridge
CA St. U., Sacramento
CA St. U., San Bernardino
CA St. U., San Marcos
CA St. U., Stanislaus
Cerritos C.
Humboldt St. U.
Mt. San Antonio C.
San Diego St. U.
San Francisco St. U.
San Jos - Evergreen CC Dist.
San Jos St. U.
Santa Rosa Junior C.
Sonoma St. U.

Expected on-line by May 1992
Los Angeles County Dept. of Education

JvNCnet
On-line now (November 1991)
Accurate Information System
Adelphi University
Advanced Media Laboratories of Samsung Electronics
American Mathematical Society
AT&T Bell Labs.
Atlantic Comm. C.
Bellcore
U. of Bridgeport
Bristol-Myers Squibb
Bryant C.
Cold Spring Harbor Lab.
Conn. C.
Conn. State U.
U. of Conn.
Dataram
Drew U.
Educational Testing Services
Fairleigh Dickinson U.
Fornax Computer
Glassboro State U.
Geophysical Fluid Dynamics Lab.
Hahnemann U.
Hydrogual, Inc.
Info Magic
Instructional Systems, Inc.
Intelecom Data Systems
IEEE
INRIA (Paris, France, & Zurich, Swiss.)
Inst. for Advanced Study
Kean C.
Matsushita Info. Tech. Lab.
Mead Data Ctr.
Meckler Publishing
U. of Medicine & Dentistry of New Jersey
Mitchell C.
Monmouth C.
Montclair State C.
National U. of Singapore
NEC Corp. Research
New Jersey Comm. on Sci. & Tech.
New Jersey Inst. of Tech.
New York Hospital
Osteonics, Inc.
U. of Penn.
Penn. State U.
Pennington Systems, Inc.
Prime Computer, Inc.
Princeton U.
U. of Rhode Island
Rhode Island C.
Rider C.
Rohm & Haas
Rutgers U.
Seton Hall U.
Siemens Corporate Research, Inc.
Star Semiconductor
Stevens Inst. of Tech.
Stockton State C.
C. of St. Elizabeth
St. Peter's C.
Thomas Edison C.
Trenton State C.
Trinity C.
Unix Systems Lab.
Wesleyan U.
William Paterson C.
Woodrow Wilson Foundation
Yale U.

Expected on-line by May 1992
Conicit - Venezuelan Nat'l Net.
Hofstra U.
Indus. Consultancy Services
Taiwan Ministry of Education

Los Nettos (Los Angeles Area Regional Networks)
On-line now (November 1991)
CA Inst of Tech.
U. of California at LA
U. of Southern CA
Information Sciences Inst.
Jet Propulsion Lab.
Naval Ocean Systems Center
The RAND Corp.
Trusted Information Systems
TRW

Merit/MichNet (Merit Network, Inc.)
On-line now (November 1991)
Alma College
Andrews U.
ArborText, Inc.
Calvin C.
Center for Machine Intelligence
Central Michigan U.
Chrysler Research
Detroit Medical Ctr.
Eastern Michigan U.
Environmental Protection Agency
Environmental Res. Inst. of Michigan
Ford Research
General Motors Res.
Genessee County Mental Health
Grand Valley St. U.
Henry Ford Hospital
Hope College
Hurley Medical Ctr.
Industrial Tech. Inst.
Jackson C.C.
Kalamazoo C.
Michigan Dept. of Commerce
Michigan Dept. of Natural Resources
Michigan Dept of Public Health
Michigan St. U.
Michigan Tech. U.
U. of Michigan
Northeast Michigan Consortium
Northwest MI Council of Governments
Northwestern Michigan College
Oakland U.
OTA Limited Partnership
Saginaw Valley St. U.
Wayne St. U.
Western Michigan U.

Expected on-line by May 1992
Warner Lambert

MIDnet (Midwestern States Network)
On-line now (November 1991)
Augustana College
U. of Arkansas
U. of Arkansas Medical Sciences Ctr.
Boystown National Res. Hospital
Buena Vista C.
Chardron State C.
Creighton U.
Dakota St. C.
Data Research Assoc.
Drake U.
EROS Data Center
FAA - Oklahoma City
FHMA - St. Louis
Iowa State U.
U. of Northern Iowa
Kansas State U.
U. of Kansas
Langston U.
Lincoln Tel. & Telegraph
Lincoln U.
Luther C.
McDonnell Douglas Corp.
MO Botanical Gardens
U. of MO - Columbia
U. of MO - Kansas City
U. of MO - Rolla
U. of MO - St. Luis
Monsanto Corp.
National Weather Service - Tulsa
Neb. Weslayan U.
U. of Neb. - Kearney
U. of Neb. - Lincoln
U. of Neb. Medical Ctr.
U. of Neb. - Omaha
Northwest MO St.
Oklahoma State U.
U. of Oklahoma
Peru State C.
St. Louis U.
South Dakota School of Mines & Tech.
South Dakota State University
U. of S. Dakota
Southern Illinois U. - Edwardsville
Southwestern Bell Corp.
Sterling Software, Inc.
U. of Tulsa
Washburn U.
Wayne State C.
Williams Telecommunications

Expected on-line by May 1992
Grinnel College
Hastings C.
Meat Animal Research Center
Northeastern State College
Rockhurst C.
Witchita State U.

MRNet (Minnesota Regional Network)
On-line now (November 1991)
Augsberg C.
Bethel C.
Burlington Northern Railroad
Carleton C.
C. of St. Catherine
C. of St. Scholastica
Concordia C. (Moorhead)
Control Data Corp.
Cray Research Inc.
Gustavus Adolphus C.

Hamline U.
Honeywell, Inc.
Macalester C.
Management Graphics, Inc.
Mayo Foundation
MN State U. Systems Net.
- Bemidji State U.
- Mankata State U.
- Metropolitan State U.
- Moorhead State U.
- St. Cloud State U.
- Southwest State U.
- Winona State U.

U. of Minnesota
NCR - Network Products Div.
Network Systems Corp.
Open Systems Architects, Inc.
Ramsey County Data Processing
Secure Computing Tech. Corp.
St. Olaf C.
St. Mary's C. of Minnesota
Supercomputer Systems Eng. & Serv. Co.
U. of St. Thomas
3M Company
Unified Comm. Inc.
Unisys Computer Sys. Div.
West Services

Expected on-line by May 1992
C. of St. Benedict
Concordia C., St. Paul
Hewlett-Packard/Apollo
Minneapolis College of Arts & Design
Minnesota Private C. Res. Foundation
Northwest Airlines
Pillsbury
Poliac Research
St. John's U.

NCSAnet (National Center for Supercomputing Applications Network)
On-line now (November 1991)
Argonne National Labs.
U. of Chicago
Fermi National Laboratory
Illinois Inst. of Tech.
Indiana U.
Nat'l Ctr. for Supercomputing Appl.
Northern Illinois U.
Northwestern U.
U. of Notre Dame
Motorola
U. of Wisconsin - Milwaukee
U. of Wisconsin - Parkside

NEARnet (New England Academic & Research Network)
On-line now (November 1991)
Atmospheric & Environmental Res.
Agranat Systems
Apple Computer
Assumption College
Aware, Inc.
Banyan Systems
Bates C.
BioTechNet
Bolt Beranek and Newman Inc.
Boston C.
Boston Public Library
Boston U.
Bowdoin C.
Brandeis U.
Brown U.
Bull HN Info. Systems Inc.
Cabletron Systems, Inc.
Cambridge Entrepreneurial Network
Centerline Software
Clark U.
Clearpoint Research Corp.
Colby C.
Computer Methods Corp.
Concurrent Computer Corp.
Creare, Inc.
Credit Technologies
Dartmouth C.
Digital Equipment Corp.
DEC Users Society
Charles Stark Draper Lab.
Dragon Systems
Encore Computer Corp.
Eclectic Associates, Inc.
FAXON
Five Colleges, Inc.
Frontier Sci. & Tech. Found.
FTP Software, Inc.
GTE Laboratories
U. of Hartford
Harvard U.
Hitachi Computer Products
Horizon Res. Inc.
Hyperdesk, Inc.
IBM Cambridge Scientific Ctr.
The Jackson Lab.
Kendall Square Research
Locus Computer Corp.
U. of Maine System
Mass. Inst. of Tech.
MIT Lincoln Lab.
Mass. Microelectronics Ctr.
Mass. Education Computer Network
U. of Mass., Amherst
The Math Works, Inc.
Merrimack C.
Middlebury C.
Miles Pharmaceutical
MITRE Corp.
Mitsubishi Electric America, Inc.
Motorola Camb. Res. Ctr.
MV Communications, Inc.
Naval Underwater Systems Ctr.
U. of New Hampshire
Nippon Telegraph & Telephone Corp.
Northeastern U.
Object Management Group
Open Software Foundation
PictureTel Corp.
Polaroid Corp.
Process Software Corp.
Prospect Innovation Ctr.
Samsung Software America
Sequoia Systems, Inc
Shiva Corp.
Siemens-Nixdorf Comp. Eng. Corp.
Silver Platter Info., Inc.
Stratus Computer
Technical Edu. Res. Ctr., Inc.
Thinking Machines Corp.
Tufts U.
U. of Vermont
Vertex Pharmaceuticals
Viewlogic Systems, Inc.
VXM Technologies, Inc.
Wellesley C.
Wellfleet Comm. Corp.
Whitehead Inst. for Bio. Res.
White Pine Software
Williams C.
Windata, Inc.
Woods Hole Oceanographic Inst.
Worcester Polytechnic Inst.
Xerox Advanced Info. Tech.
Xylogic Corp.
Xyplex Corp.
Ziff Information Systems

Expected on-line by May 1992
Analog Devices
Asea Brown Boveri
Cygnus Support
College of the Holy Cross
Epilogue Technology
GTECH Corp.
International Space University
Raytheon Adv. Systems Engineering
Suffolk University
Target Systems Corp.

NevadaNet (The Nevada Network)
On-line now (November 1991)
Community College of Southern Nevada Cheyenne Campus - Cheyenne
Community College of Southern Nevada – Henderson Campus
Desert Research Institute - Las Vegas Campus
Desert Research Institute - Stead Campus
Desert Research Institute - Reno Campus
University of Nevada, Las Vegas
University of Nevada, Reno
Western Nevada Community College - Fallon Campus

Expected on-line by May 1992
Community College of Southern Nevada Health Science Center
Northern Nevada Community College
Truckee Meadows Community

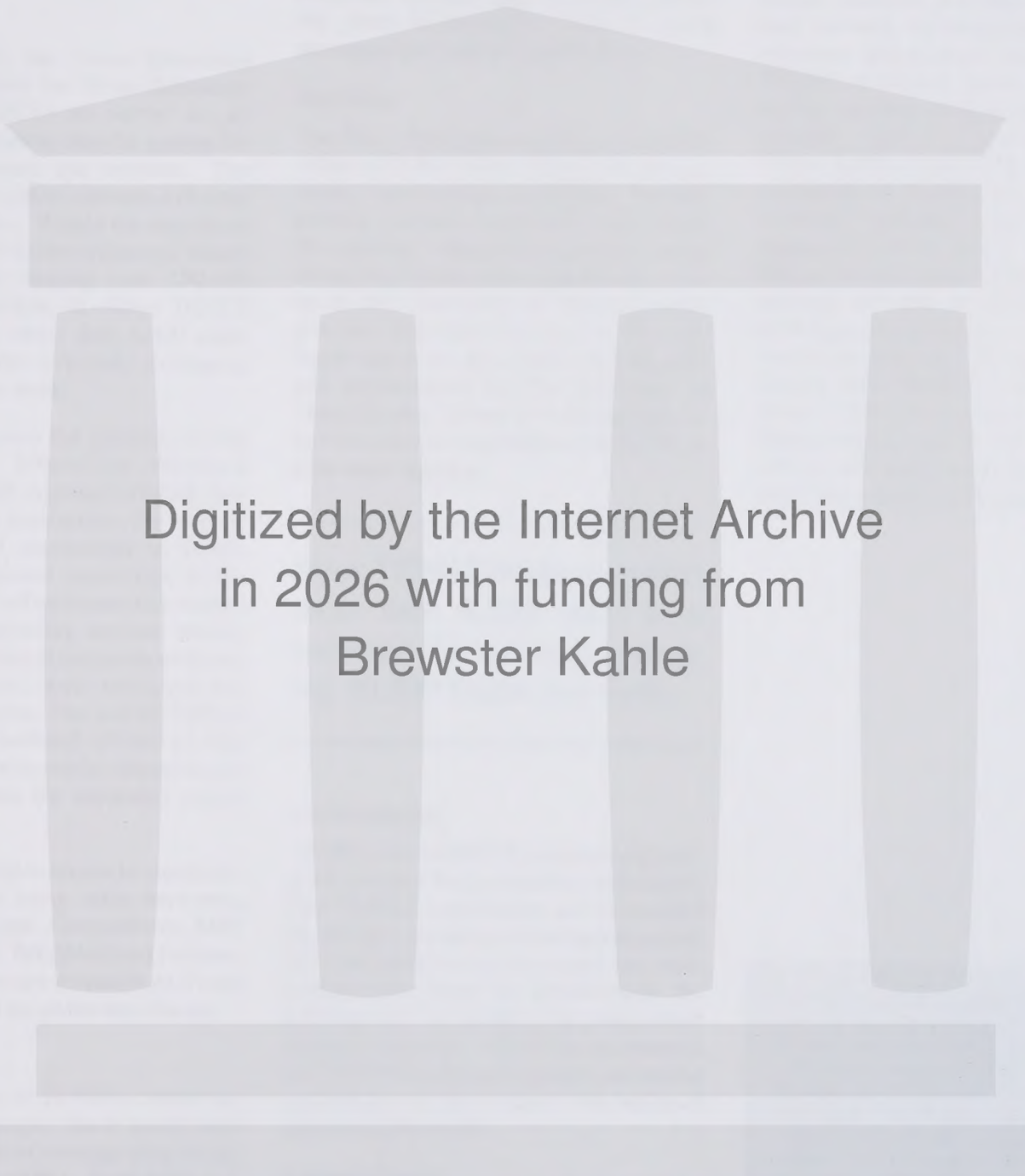
NorthWestNet (Northwestern States Network)
On-line now (November 1991)
Advanced Hrdwr Architectures
U. of Alaska, Computer Net.
U. of Alaska, Fairbanks
U. of Alaska, Anchorage
U. of Alaska, Southeast
Analytical Methods
Bismark State CC
Boeing
Clark College
Dickinson State U.
Eastern OR St College
Evergreen State College
Fred Hutchinson Cancer Rush Ctr.
Hatfield Marine Science Center
U. of Idaho
Lewis & Clark College
Linfield College
Mayville St U.
Microsoft
Minot State U.
Montana State U.
Montana College of Min Sci & Tech
Montana Univ. System & Education Network
Eastern MT College
Northern MT College
Western MT College
U. of Montana
ND Higher Education Cmptr. Net.
ND State U.
ND State U - Bottineau
ND State College of Science
U. of ND - Williston
U. of ND - Lake
U. of ND
Oregon Advanced Computing Inst.
Oregon Graduate Inst. of Sci & Tech.
Oregon Health Sciences U.
Oregon Institute of Tech.
Oregon State U.
U. of Oregon
Pacific Marine Env. Labs.
Pacific NW Labs
Pacific University
Portland State U.
Reed College
Seattle U.
Southern OR St College
U. of Washington (Seattle)
Valley City State U.
Walker, Richer & Quinn
Washington State U. (Vancouver)
Washington State U. (Richland)
Washington State U. (Pullman)
Western Oregon St College
Western Washington U.
Willamette University
XKL Systems

NYSERNet (New York State Education and Research Network)
On-line now (November 1991)
Albert Einstein Col. of Medicine
Alfred U.
American Inst. of Physics
American Physical Society
Bard C.
Baruch College of CUNY
Bronx High School of Science
Brookhaven National Lab.
Brooklyn College of CUNY
BELWUE (W. Germany)
Canisius College
City College
City U. of New York
Clarkson U.
Columbia U.
The Cooper Union
Cornell U.
Eastman Kodak Corp. Res.
Engineering Info. Inc.
Fordham University
General Electric - Syracuse
General Electric Corp. Res. & Dev.
Graduate Center of CUNY
Grumman Data Systems Corp.
Hamilton College
Hartwick College
Hunter College of CUNY
IBM - Kingston
IBM - White Plains
IBM - Yorktown Heights
ILAN (Israeli Network)
Lehman College of CUNY
LSW BOCES
Marist College
Marlboro High School
Nassau Community College
Memorial Sloan-Kettering Cancer Ctr.
Mt. Sinai School of Medicine of Cuny
NYC Board of Education
New York Blood Center
New York Medical C.
New York Public Library
New York State Edu. Dept.
New York U.
NYNEX Science and Tech.
Polytechnic U.
Queens College of CUNY
Rensselaer Polytechnic Inst.
University of Rochester
Rochester Institute of Tech.
Rockefeller University
Rome Labs
St. Bonaventure U.
Skidmore C.
State U. of New York at Albany
State U. of New York at Binghamton
State U. of New York at Buffalo
State U. of New York at Fredonia
State U. of New York at Geneseo
State U. of New York at Oswego
State U. of New York at Plattsburgh
State U. of New York at Potsdam
State U. of New York at Purchase
State U. of New York at Stony Brook
State U. of New York, C. of Tech. at Utica/Rome
SUNY Health Science Ctr. of Syracuse
Syracuse U.
Union C.
Utica College
Vassar C.
Xerox/Webster Res. Ctr.

OARnet (Ohio Academic Resources Network)
On-line now (November 1991)
Air Force Institute of Tech.
Antioch C.
U. of Akron
AT&T
Bowling Green State U.
British Petroleum
Case Western Reserve U.
Central State U.
Chemical Abstracts Service
U. of Cincinnati
Cleveland Clinic Foundation
Cleveland Public Library
Cleveland State U.
U. of Dayton
Denison U.
Hiram C.
Franklin U.
Heidelberg C.
Hudson High School
John Carroll U.
Kent State U.
Kenyon C.
Malone C.
Medical C. of Ohio
Miami U.
Muskingum C.
NASA-Lewis Res. Ctr.
Northeastern Ohio Universities C. of Medicine
Oberlin C.
Ohio Data Network
Ohio Network for Info. Exchange
Ohio Northern U.
The Ohio State U.
Ohio U.
Ohio Wesleyan C.
Online Computer Library Center
Shawnee State U.
Sinclair Comm. C.
Wilberforce U.
Wittenberg U.
C. of Wooster
Wright State U.
Youngstown State U.

Expected on-line by May 1992
Baldwin Wallace U.
Capital U.
DeVry Institute of Technology
Mt. St. Joseph
Mt. Vernon Nazarene C.
Ohio Dominican C.
Wilmington C.

PREPnet (Pennsylvania Research and Economic Partnership Network)
On-line now (November 1991)
Allegheny College
Allegheny - Singer Res. Inst.
Bell of PA
Bryn Mawr C.
Bucknell U.
Carnegie Group, Inc.
Carnegie Mellon U.
Datacomp Systems, Inc.
Devon Systems, Inc.
Drexel U.
Duquesne University
Dynamic Digital Displays
Gettysburg College
Haverford C.
HRB Systems
Health Sciences Lib. Consortium
Int'l Ctr. for Defraction Data
Incremental Systems Corp.
Indiana U. of Penn.
Juniata College
Lafayette C.
LaSalle U.
Lebanon Valley College
Lehigh U.
MAYA Design Group
Moravian College
Muhlenberg College
Penn. State U.
U. of Penn.
Pine Creek Software
Pittsburgh Supercomputing Ctr.
Bell of PA
U. of Pittsburgh
U. of Scranton
Soc. for Ind. & Applied Math.
Soft-Switch, Inc.
Software Engineering Inst.
Susquehanna U.



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Swarthmore C.
Tartan Laboratories, Inc.
Temple U.
Thomas Jerfferson U.
Transarc Corp.
Unisys Paoli Res. Ctr.
U.S. Bureau of Mines
USS Technical Ctr. USX Corp.
Villanova U.
Visual Understanding Systems, Inc.
WEA Manufacturing, Inc.
West Chester U.
Widener U.
Wilkes U.

Expected on-line by May 1992
BIOSIS
Children's Hospital
Commonwealth of PA
Dickinson College
Franklin and Marshall College
Lincoln Univ.
Munin Systems, Inc.
NET Ben Franklin Tech. Ctr.
Telebase Systems, Inc.

PSCnet (Pittsburgh Supercomputing Center Academic Affiliates Group Network)
On-line now (November 1991)
Alcoa Technical Ctr.
Carnegie Mellon U.
Pittsburgh Supercomputing Ctr.
PREPNET
U. of Pittsburgh

PSInet (Performance Systems International Network)
On-line now (November 1991)
Advanced Comm. Systems
AIL Systems, Inc.
AKZO Chemicals, Inc.
Alliant Computer Systems Corp.
Alliant Techsystems
Allied Telesis, Inc.
American College of Radiology
American Express Company
Amtec Engineering, Inc.
Ancor Communications, Inc.
Anterior Technology
Applied Logic Systems
Applied Materials (Israel) Ltd.
Auspex Systems, Inc.
Austin Code Works
Automatic Data Processing
Avnet Core Investors Inc.
Axe Core Investors Inc.
BARRA
B.B.D.O.
BKS Systems, Inc.
Booz Allen & Hamilton
BRS Software Products
CAE-Link Corp.
Calspan Advanced Technology
Canadian Def. Res. Network
Candle Corp.
Carlyle Systems Inc.
Cayman Systems, Inc.
CD Plus
Cellular Technical Services
Center for Disease Control
Cheyenne Software Inc.
Chipcom Corporation
The Chronicle of Higher Education
cisco Systems - Menlo Park, CA
cisco Systems - Princeton, NJ
Citibank - Hong Kong
Citicorp
CMA, Inc.
CSX-LIS, Inc.
CWA Comm. Products, Inc.
DARPA/MIS
Datability Software Systems, Inc.
Data General Corp.
Datalogics
Datatec Industries
DB Resource, Inc.
Design Engineering, Inc.
Digicomp Research
DMCA Direct
Dover Beach Consulting, Inc.
Dr. Pepper/7UP Company
Dunn & Bradstreet Software/ Info. Assoc.
EEsof Inc.
E.I. DuPont-Electronic Imaging
Electronic Frontier Foundation
Electronics for Imaging Inc.
EJV Partners
Facsimile Marketing, Inc.
Fibermux Corp.
Finnigan Corp.
The First Boston Corp.
First National Bank of Chicago
FTP Software, Inc. Wakefield MA
FTP Software, Inc. San Francisco, CA
Franklin Electronic Publishers
Fusion System Group
Gage Talker Corp.
Gaylord Brothers
GE Aircraft Engines
GE Aerospace
General Data Comm.
General Logistics International
Gerber Alley Technology
The Hartford Graduate Center
Hewlett-Packard Company
Hitachi Computer Products
Hughes Network Systems
IBM Corp - Kingston
IBM Corp - White Plains
Ideas, Inc.
ILAN (Israel)
Image Business Systems
ImTech
Independence Technologies
Industrial Light & Magic
Infonet Services Corp.
Information Electronics
Integrated Measurement Systems
InterCon Systems Corporation
Intergrated Device Technology, Inc.
Intrepid Technology Inc.
Ironics, Inc.
ISX Corporation
Kaman Sciences Corp.
Lever Industries
Lockheed Missles & Space Corp.
Lucky Duck Productions, Inc.
The Math Works
Market Vision
Maxwell Online Inc.
McDonnell Douglas
Mentor Graphics Corp.
Merrill Lynch
Microcom Inc.
Micronics Computers
Mier Communications
Mission Media Partners, Inc.
Mitem Corp.
Mitsubishi Electronics America
Mobile Digital Corp.
Morning Star Technology
MSEN, Inc.
Nanometrics, Inc.
National Academy of Science
National Institutes of Health
National Youth Employment
NCR Corp.
NetExpress, Inc.
NetManage, Inc.
Netrix Corp.
Network Computing Devices
Network Systems Corp.
New Methods Research
Newsday
Network World
Nippon Telegraph & Telephone
Northrup Corp.
NYSERNet, Inc.
Objective Systems Intergrators
Objectivity, Inc.
Open Vistas International
ORA Corporation
Orbot Systems Ltd.
Pergamon Press
Petro Vision Inc.
Phibro Energy, Inc.
Philips Labs
PRC Inc.
Proteon, Inc.
Proxar Tech. Inc.
Quarterdeck Office Systems
Quest Systems Corp.
Reach Networks
Readmore Inc.
Rocket Research Co.
Rosenbluth Travel Agency
S3 Technologies
St. Joseph's Univ.
Sales Technologies
Samsung Information Systems
Savannah River Ecology Lab
Scientific Atlanta
Search Technologies
Secure Online Systems
Securities Information Group
Shell Development Co.
Silicon Graphics, Inc.
Simware
Small Bus. Data Systems
SmithKline Beecham Pharmaceuticals
Software Group LTD
Spartacus, Inc.
Spectrum Healthcare Systems
Standard Micro Systems
Star-Tek, Inc.
Sun Microsystems Computer Corp.
Symbol Technologies, Inc.
Systems & Computer Tech. Corp.
Systems Res. & Appl. Corp.
Tenon Intersystems
3D/EYE, Inc.
3M/Health Info. Systems
Telesoft America, Inc.
Telogy Networks, Inc.
Telxon Corp.
TIAA/CREF
Tom Sawyer Software Corp.
Tribe Computer Works, Inc.
Trident Data Systems
Twenty-First Designs
United Technologies Res. Ctr.
US ARMY - Cold Reg R&E Labs
US Department of Commerce
US Sprint
Visix Software
Vitalink
Vitel Communications
Vitro Corporation
VNP Software
Wal-Mart Stores
John Wiley & Sons
The Wollongong Group
XLINK/BELWUE (Germany)

SDSCnet (San Diego Supercomputer Center Network)
On-line now (November 1991)
AeroJet/Sacramento
U. of CA San Diego**
General Atomics**
Horst Celanese - Summit, NJ
Horst Celanese - Charlotte, NC
Jet Propulsion Lab.
U. of Nevada Las Vegas
Naval Ocean Systems Ctr. San Diego
Res. Inst. of Scripps Clinic
S-CUBED
San Diego Supercomputer Ctr.
Salk Inst.
Scripps Inst. of Oceanography
Teale Data Ctr.

Expected on-line by May 1992
CSUnet**
ITER
**Joint with CERFnet

SESQUINET (Texas Sesquicentennial Network)
On-line now (November 1991)
Baylor C. of Medicine
Baylor C. of Medicine-Tech.
Baylor U.
Baylor U. Medical Center
Clear Lake High School
Compaq Computers
U. of Dallas
Exlog
Exxon
Fisher Controls
HNSX
Houston Advanced Research Ctr.
The Houston Chronicle
U. of Houston U. Park
IBM - Clear Lake
IMSL
Lamar U.
Landmark Graphics
Mobil
U. of North Texas
Prairie View A&M U.
Rice U.
Rockwell International
Schlumberger Research
Southern Methodist U.
Southwest Research Ctr.
S.F. Austin State U.
Tandem
Teledyne
Texaco
U. of Texas at Dallas
Texas A&M U.
Texas Instruments
Texas Southern U.

Expected on-line by May 1992
Northern Telecomm/BMR
Prairie View A&M Sch. of Nursing

SURAnet (Southeastern Universities Research Association Network)
On-line now (November 1991)
Advanced Decision Systems
Alabama Supercomputer Net.
U. of Alabama at Birmingham
U. of Alabama at Tuscaloosa
Alternet/UUnet
American U.
Applied Physics Lab/ Baltimore
Armstrong C.
Auburn U.
Augusta C.
Barry U.
Carnegie Inst. of WA/Baltimore
U. of S. Carolina
Catholic U. of America
Ctr. for Innovative Technology
Ctr. for Seismic Studies
Ctr. for Disease Control I
Ctr. for Disease Control II
Christopher Newport C.
Clemson U.
Coalition for Networked Info.
College of William and Mary
Compt. Sci. Corp.
Contel Federal Systems
Continuous Electron Beam Accelerator Facility
DARPA/ISTO
Defense Comm. Engineering Ctr.
E.I. duPont de Nemours & Co., Inc.
EBSCO
U. of Delaware
EDUCOM
Emory U.
FIRN (Florida Inst. Res. Net.)
Florida Alantic U.
Florida Inst. of Tech.
Florida Inter. U.
U. of Florida
Florida State U.
U. of Central Florida
U. of North Florida
U. of Southern Florida
U. of West Florida
Fox Chase Cancer Ctr.
Gallaudet U.
General Systems Group, Inc.
George Mason U.
Georgetown U.
George Washington U.
Georgia Institute of Tech.
Georgia Southern U.
Georgia State U.
U. of Georgia
Hampton U.
Hand Held Products, Inc.
Harris Corp.
Hood C.
Howard U.
ICASE (Inst. for Compt. Applications in Sci. & Eng.)
Inc. Res. Inst. for Seismology
Institute for Higher Learning
Jackson St. U.
James Madison U.
Johns Hopkins U.
Kennesaw St. C.
U. of Kentucky
Library of Congress
U. of Southwestern Louisiana
Loyola C. of Maryland
Mary Washington C.
U. of Maryland
Medical U. of South Carolina
Memphis St. U.
Mississippi St. Computing Ctr.
Mississippi State U.
U. of South Mississippi
U. of Mississippi
U. of Mississippi Medical Center
Montgomery Blair High School
NASA Admin./Goddard
NASA Admin./Langley
Nat'l Agriculture Library
Nat'l Astronomy & Inosphere Ctr. Arecibo Observatory
Nat'l Biomedical Res. Foundation
Nat'l Cancer Inst. / Frederick Cancer Res. Ctr.
Nat'l Inst. of Health
Nat'l Inst. of Standards & Tech.
Nat'l Library of Medicine
Nat'l Radio Astronomy Observ.
Nat'l Radio Astronomy Observ. - Green Bank
Nat'l Science Foundation
Nat'l Space Technologies Laboratories
Naval Res. Laboratory (Washington, DC)
Naval Res. Laboratory (Orlando, FL)
Naval Oceanographic Res. & Dev. Activity
Inst. of Naval Oceanography
Nova U.
U. of New Orleans
U. of Puerto Rico - Rio Piedras Campus
Oak Ridge Nat'l Labs.
Office of the Chief of Naval Res.
Office of Info. Tech. - Kennesaw St. C.
Old Dominion U.
Pratt & Whitney
Radford U.
Science Applications Inter. Corp.
Software Productivity Consortium
South Carolina Res. Authority
Spelman C.
St. Jude Children's Res. Hospital
State Board of Regents
Supercomputer Res. Ctr.
Telematics, Inter.
Tulane U.
United Nations Development Program
U. of Tennessee - Knoxville
U. of Tennessee - Memphis
U.S. Army Engineers, Waterways Exper. Station
U.S. Coast Guard
U.S. Dept. of Energy/ OSI
U.S. Geological Survey
USDA/ARS/ Nat'l Germplasm Res. Lab.
USDA/ Extension Service
Vanderbilt U.
Virginia Commonwealth U.
Virginia Military Institute
West Virginia U.
Virginia Polytechnic Inst.
Washington & Lee U.
Westinghouse Savannah River Co.
U. of Virginia
C. of William & Mary

Expected on-line by May 1992
Center for Seismic Studies
David Taylor Res. Ctr.
Electronic Warfare Assoc.
LSU Medical Center
Louisiana Tech
Millsaps College
National Capital Plng. Comm.
Northeast Louisiana U.
SAIC/IDS
Thomas Jefferson High School
US Coast Guard

THEnet (The Texas Higher Education Network)
On-line now (November 1991)
Abilene Christian U.
Arco Oil & Gas
Baylor U.
Brooke Army Medical Ctr.
Brooke School of Aerospace Med.
Computational Logic Inc.
Convex Computer Corp.
East Texas State U.
Houston Area Research Center
U. of Houston
IBM Advanced Workstation Group
Instituto Tecnologico y de Estudios Superiores de Monterrey
Lamar U.
Lockheed Austin Division
Merit Technology Inc.
Microelectronics Computer Corp.
Nat'l Instruments
Oryx
Prarie View A&M U.
Rice U.
Rockwell Int'l
SEMATECH
St. Mary's U.
Sam Houston State U.
Schlumberger Ltd.
Southwest Research Inst.
Southwest Texas State U.
Stephen F. Austin State U.
Superconducting Super Collider Labs
Tandem Computers Inc., Austin
Texas A&M University
Texas Cancer Data Ctr.
Texas Ctr. for Osteopathic Medicine
Texas Christian U.
Texas Higher Ed. Coordinating Board
Texas Instruments Inc.
Texas School for the Blind
Texas State Purchasing & Gen. Services Comm.
Texas Tech U.
Texas Women's U.
U. of Texas at Arlington
U. of Texas at Austin
U. of Texas at Dallas
U. of Texas at El Paso
U. of Texas at San Antonio
U. of Texas at Tyler
U. of Texas of the Permian Basin
U. of North Texas
U. of Texas Health Center at Tyler
U. of Texas Health Science Ctr. at Houston
U. of Texas Health Science Ctr. San Antonio
U. of Texas M.D. Anderson Cancer Center
U. of Texas M.D. Anderson Cancer Ctr. Science Park
U. of Texas Marine Science Institute
U. of Texas McDonald Obervatory
U. of Texas Medical Branch at Galveston
U. of Texas Pan American
U. of Texas Pan American at Brownsville
- Wilford Hall Medical Ctr.
U. of Texas Southwestern Med. Ctr. at Dallas
U. of Texas System Admin.
U. of Texas System Ctr. for High Performance Comp.
U. of Texas System Office of Telecomm. Serv.
U. of Texas System Lands Office
U. of Texas West Texas Lands Management
Trinity Univ.

UIUC/net ILLINOIS
On-line now (November 1991)
Army Construction Eng. Res. Lab.
Bradley U.
Eastern Illinois U.
Millikin U.
Southern Illinois U. - Carbondale
U. of Illinois - Chicago
U. of Illinois - Urbana Champaign
Wolfram Research

USAN (University Satellite Network)
On-line now (November 1991)
Inst. for Naval Oceanography
U. of Miami
Nat'l Ctr. for Atmospheric Res.
Oregon State U.
Pennsylvania State U.

VERnet (Virginia Education and Research Network)
On-line now (November 1991)
Bridgewater College
CEBAF
Ctr. for Innovative Tech.
Christopher Newport C.
George Mason U.
Hampton Cont. Education Ctr.
Hampton U.
Hand Held Products, Inc.
James Madison U.
Longwood C.
Mary Washington C.
Norfolk State U.
Northern Virginia Grad. Ctr.
Old Dominion U.
Radford U.
Richmond Cont. Education Ctr.
Roanoke Cont. Education Ctr.
U. of Richmond
Roanoke Valley Grad. Ctr.
Software Productivity Const.
State Council of Higher Ed. of VA
Virginia Commonwealth U.
Virginia Dept. of Ed.
Virginia Inst. of Marine Sci.
Virginia Military Inst.
Virginia State U.
Virginia Tech.
U. of Virginia
Washington & Lee U.
College of William & Mary

Expected on-line by May 1992
Lynchburg City Library
Lynchburg College
Lynchburg Cont. Education Ctr.
Randolph Macon Women's College
Sweet Briar College
Virginia Dept. of Info. Tech.

Westnet (Southwestern States Network)
On-line now (November 1991)
Apache Point Observatory
Arizona State U.
Northern Arizona U.
U. of Arizona
Boise State U.
Boulder Valley School District
Brigham Young U.
Bureau of Reclamation
Casper College
College of Eastern Utah
Colorado Alliance of Res. Libraries
Colorado College
Colorado Comm. on Higher Education
Colorado Dept. of Local Affairs
Colorado Office of Economic Dev.
Colorado School of Mines
Colorado State U.
U. of North Colorado, Greeley
U. of Southern Colorado
U. of Colorado - Boulder
U. of Colorado - Colorado Springs
U. of Colorado - Denver
U. of Colorado - Health Sci. Ctr.
Contel Federal Systems
Cray Computer Corp.
Denver Ctr. for the Performing Arts
Dixie College
U. of Denver
Dugway
Embry Riddle Aeronautical Univ.
Ft. Lewis College
George Washington High School
Gillette College
Grand Canyon U.
Hewlett Packard
ICON Systems
Idaho Nat'l Eng. Lab.
Idaho State U.
U. of Idaho - Idaho Falls
Iomega
Laramie County Community C.
Los Alamos National Lab.
Maricopa Community College
Martin Marietta
McData Corp
Mesa State College
Metro State C.
Motorola
Nat'l Ctr. for Atmospheric Res.
Nat'l Optical Astronomy Observ.
Nat'l Renewable Energy Lab
Nat'l Solar Observatory-Sunspot
Nat'l Tech. U.
Nat'l Weather Service
NRAO/VLA, Socorro
Nat'l Solar Observatory
U. of New Mexico - Albuquerque
New Mexico Inst. of Mining & Tech. - Socorro
New Mexico State U. - Las Cruces
New Mexico Technet
Novell
Phillips Lab
Pima Community College
Rockwell Power Systems
Rocky Mountain HS
Salt Lake Community C.
Sandia Nat'l Labs.
Santa Fe Inst.
Smithsonian Astrophysical Observ.
Snow College
Solbourne Computer
Sunquest
U.S. Geological Survey
US West
U. of Utah
Southern Utah U.
Utah St. Board of Regents
Utah Valley Community C.
Utah State Library
Unisys
United Tech. Optical Sys.
Utah State U. - Logan
Weber State C.
Western State College
White Sands Missile Range
Central Wyoming C.
Eastern Wyoming C.
Western Wyoming C.
U. of Wyoming - Laramie

Expected on-line by May 1992
Prescott High School District
Western State (Gunnison, Co)
Yavapai Valley School District

WiscNet (The Wisconsin State Network)
On-line now (November 1991)
Beloit College
Carroll College
Edgewood College
Lawrence University
Marquette University
Medical C. of Wisconsin
Milwaukee School of Engineering
Ripon College
St. Norbert College
U. of Wisconsin - Eau Claire
U. of Wisconsin - Green Bay
U. of Wisconsin - La Crosse
U. of Wisconsin - Madison
U. of Wisconsin - Centers
U. of Wisconsin - Extension
U. of Wisconsin - Systems
U. of Wisconsin - Milwaukee
U. of Wisconsin - Oshkosh
U. of Wisconsin - Parkside
U. of Wisconsin - Platteville
U. of Wisconsin - River Falls
U. of Wisconsin - Stevens Point
U. of Wisconsin - Stout
U. of Wisconsin - Superior
U. of Wisconsin - Whitewater

National and International Service Providers

Alternet (UUNET Communications)

ANS (Advanced Network & Services, Inc.)

ICM (International Connections Manager)

JvNCnet (JvNCnet Computer Network)

PSInet (Performance Systems International)

For more information about Network Service Providers, contact the NNSC.

TENET

by Connie Stout

In August 1991, the Texas Education Agency established the Texas Education Network (TENET) to serve as an electronic information transfer system for the state's educators and students. The Texas education system services a diverse student population. Within the state there are more than 1,050 school districts, which have enrollments ranging from 190,000 students to fewer than 10. Since TENET began operation, more than 4,300 users have accessed the network, averaging 10,500 logins per week.

TENET users access the Internet via the Texas Higher Education Network (THEnet), an NSF regional network that provides Internet connections for most of the colleges and universities in Texas. Through this regional connection to the Internet, TENET offers access to a variety of resources, including on-line library catalogues, educational computer archives, public databases, and instructional hypermedia libraries. The use of THEnet is in line with national efforts to link higher education with public education and offers the potential for expanded access over the Internet.

TENET also provides access to electronic mail gateways at many other networks, including AppleLink, CompuServe, MCI mail, AT&T mail, FrEdMail and Fidonet. These connections are available to Texas educators without an additional charge.

Configuration

The configuration of TENET is based on a distributed design. Each local host consists of a series of message processing and storage units (MPS). Each MPS is a UNIX system that has 24 Megabytes of memory, 1 Gigabyte of disk, and a backup tape. The central host is located at the University of Texas System Office of Telecommunication Services. Local phone access, as well as 800-line service, is provided in Austin, Texas. Seven other message processing and storage (MPS) computer systems are distributed across the state at university sites to store messages and support applications.

Services

The Texas Education Agency, in collaboration with the Texas Center for Educational Technology, designed TENET training courses, which are conducted at 20 regional education service centers throughout Texas. The Computation Center at the University of Texas, Austin, provides help-desk services for TENET. Applications on the system are designed and implemented by The University of Texas System Office of Telecommunication Services in cooperation with the Texas Education Agency.

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Conferencing

TENET uses USENET conferencing software to create Texas-specific conferences. The TENET conferences are moderated by teachers, so that as telecommunications are introduced in the classroom, the moderators can create an environment for learning and can establish the protocols of network etiquette. All of the moderators on TENET are trained to guide conference participants as they explore the world of telecommunications.

Collaboration

TENET telecommunications projects bring students, teachers, and members of the network community together from across state and national boundaries. TENET supports collaboration between K-12 educators and post-secondary educators in several ways. For a nominal fee of $5 per year and no on-line cost, Texas administrators, teachers, and students can extend their network communication to include educators and students around the world. TENET members have access to the on-line services of libraries at major universities, such as University of Texas, Texas A&M, University of California, University of Hawaii, and University of Colorado. Members also have access to resources such as NASA's Spacelink in Huntsville, Alabama. Through Spacelink, teachers are able to communicate with astronauts and scientists as well as retrieve classroom materials for their own use. Among other TENET resources are UPI news, CNN Newsroom lessons, and Newsweek Lessons. In 1992, the network will provide access to an on-line encyclopedia and a study skills guide. ■

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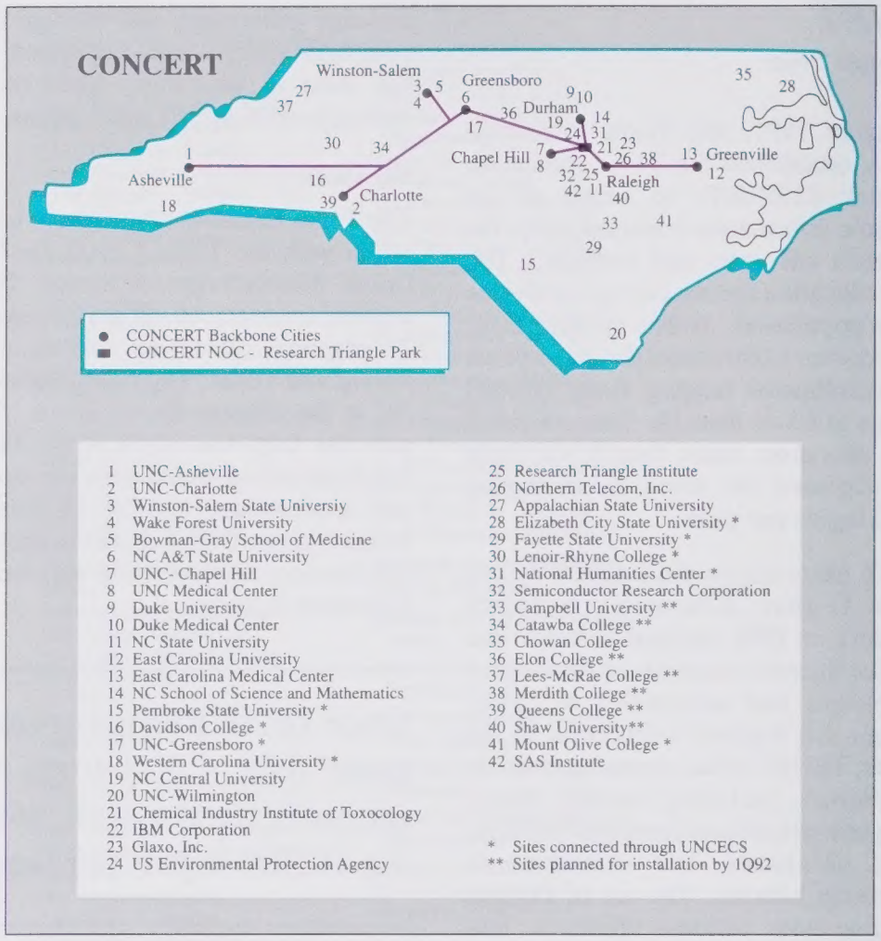
CONCERT

by Joseph Ragland

CONCERT, Communications for North Carolina Education, Research, and Technology, consists of two networks, an NTSC full-duplex video network and a mid-level IP computer network that serves North Carolina. The networks are built from a private backbone of 450 path miles of microwave radio circuits with points-of-presence (POPs) in nine North Carolina cities, from which the computer network connects 33 colleges, universities, nonprofit organizations, companies, and government laboratories. Through Advanced Network and Services, Inc., CONCERT connects to the NSFNET backbones at its network operations center, which is located in Research Triangle Park.



Though CONCERT is a relatively new name, the network began with the establishment of the Microelectronics Center of North Carolina (now named MCNC) in the early 1980s. The network was originally built to facilitate collaboration between researchers at various universities and laboratories involved in microelectronics research. In more recent years, the role of MCNC has expanded with the establishment of the North Carolina Supercomputing Center (NCSC) and the Center for Communications (which operates CONCERT). The Center for Communications and the CONCERT Network receives most of its support directly from the North Carolina Legislature.

The analog video network provides two full-duplex channels that can be used simultaneously for distinct programming. A third full-duplex channel connects North Carolina's four medical centers. Each backbone site has at least one video classroom and one conference facility. The data network operates from its own microwave radios, which share 23 tower sites with the video network. For data and computer networking purposes, there are at least 25 Mbps capacity delivered to each CONCERT backbone site, and 45 Mbps circuits connect four backbone nodes and the NOC. Local telco circuits connect from CONCERT POPs to sites off the backbone.

VISTANET

CONCERT is also associated with the Center for Communications networking research group, which is a partner in the VISTANET gigabit testbed. VISTANET is a project that explores and develops networking with SONET and ATM technologies. It is funded by the Department of Defense and the National Science Foundation through the Corporation for National Research Initiatives. Another research project involves development of networked video using IP protocols. This project is of particular interest to the CONCERT community because of its established dependence on video networking.

The primary mission of the Center for Communications is to provide and operate an advanced communications network for university research and education in North Carolina, and to build collaborative university research and industry programs in communications. The Center has five primary program elements: education and collaboration, communications research, networking, operations, and economic development. Program activities are coordinated closely with the North Carolina Supercomputing Center at MCNC and are tightly integrated to use the strengths of each to benefit the education and research community of North Carolina. For more information on CONCERT or the MCNC Center for Communications, send email to info@concert.net. ■

SUPERCOMPUTING '92

Supercomputing '92, the fifth annual high performance computing conference, will be held in Minneapolis, Minnesota, November 16 through 20, 1992. In keeping with the five-hundreth anniversary of Colombus' voyage, the theme of Supercomputing '92 is "Voyages of Discovery." Throughout the past 500 years, numerical computation has been one of the vehicles by which many important discoveries were made.

Today, a half century into the era of electronic computation, a steady increase in the number of circuit pads per square centimeter of silicon is making possible computing systems in which many vector processors work in parallel. These parallel systems enable us more accurately to reflect and simulate a variety of real-world phenomena and thus make even more discoveries.

Supercomputing '92 will focus on the past, present, and future role of supercomputing in society, with a special emphasis on its potential as an aid to discovery. The conference will consist of a technical program, an industry exhibition, and tutorials. Attendees will include users, developers, implementors, and managers of supercomputing and supporting technologies. The technical program will include contributed and invited papers, panels, round tables, workshops, and research exhibits. The exhibitions will feature hardware and software products from all sectors of the computing industry. Tutorials will provide an opportunity for in-depth study of a variety of topics.

Workshops

The Supercomputing '92 Program Committee intends to enhance the program by offering workshops organized by leaders in their respective fields. These workshops allow interaction among participants pursuing common technical interests. The workshops will be open to all attendees, and an abstract of the workshop will be published in the conference proceedings. A collective honorarium for the organizers will be offered. A wide variety of topics is welcome. Workshops are particularly useful for discussing broad and difficult issues related to computing environments. Examples include: development environments, "the network is the computer," K-12 Education and advanced computing, and use of the National Research and Education Network.

Tutorials

The Supercomputing '92 Conference Committee encourages the submission of half-, full-, or extended-day tutorials. A popular feature of previous Supercomputing conferences, these sessions are intended to be lecture-style presentations with visuals distributed to the attendees. Lecturers are expected to present a quality tutorial in their area of expertise and submit visual illustrations prior to the meeting for reproduction. The tutorials will be scheduled on the Monday and Friday of the conference. Tutorial presenters will receive travel assistance, and honoraria. Extended-day tutorials provide an opportunity for a mini-course introduction to a topic; this is intended to be a full day of intense learning and exploration.

BOF Sessions

At Supercomputing '92, birds-of-a-feather (BOF) sessions will provide an opportunity for conference registrants to participate in informal, spontaneous discussions on topics of mutual interest. Unlike workshops, BOF sessions will normally be scheduled during the evening hours of the conference.

The technical program will explore the advances being made in the supercomputing industry, while highlighting and reflecting on some of the historical milestones in the area of computation. A wide spectrum of topics relating to the field of high performance computing will be covered. These include, but are not limited to, applications, algorithms, architectures, performance, networking, graphics and visualization, software, systems, and programming environments.

To receive further information, please contact Susan Cross, SC'92 Publicity Chair, National Center for Atmospheric Research, P.O. Box 3000, Boulder, Colorado 80307 (email: *susanc@ncar.ucar.edu*, phone: (303) 497-1133).

ARCHIE

McGill University has established archie, a central database for information about archive sites, which speeds the task of finding programs on the net. Archie keeps track of UNIX sites; VMS sites may be added in the near future.

Archie consists of a pair of software tools: the first maintains a list of several hundred Internet FTP archive sites, each of which is updated about once a month. The second tool allows outsiders to log onto the host to query the database. Archie also maintains a Software Description Database of the names and descriptions of various software packages, documents, and datasets that are kept on anonymous FTP archive sites around the Internet. The **whatis** command allows you to search this database.

Network Access

To access archie, **telnet** or **rlogin** to *quiche.cs.mcgill.ca* (132.206.2.3) as user **archie**. The **help** command gives you information about various topics, including the commands available and how to use them. The "raw" listings of FTP sites are stored in compressed form in the directory **ftp/archie/listings**. Manual pages for archie are available in the directory **ftp/archie/doc**. The file **archie.man.roff** contains a UNIX-style manual entry in *roff format; **archie.man.txt** contains the same information preformatted for people on non-UNIX systems.

Users can ask archie to search for specific name strings. For example, **prog kcl** would find all occurrences of the string "kcl" and tell you which hosts have entries with this string, the size of the program, its last modification date, where it can be found on the host, and some other useful information. This example would find archive sites that are storing Kyoto Common Lisp. Complete anonymous FTP listing of sites in the database can be obtained via the **site** command; for a list of sites, see the **list** command.

If you are unable to access the manual files via interactive FTP or the mail-based servers, send a message to *archie-admin@cs.mcgill.ca* asking to receive a copy of the manual by mail.

There is an electronic mail interface to archie. To receive the latest information on this interface, send mail to *archie@cs.mcgill.ca* with the word **help** in the subject line or body.

Who Can Use the Archive

Archie is available to all Internet users. Send comments, bug reports, etc. to: *archie-l@cs.mcgill.ca*. If you know of an anonymous FTP site that archie doesn't seem to maintain, or if you have additions or corrections to the Software Description Database, send mail to: *archie-admin@cs.mcgill.ca*.

The archie group strongly encourages maintainers of anonymous FTP archives to do two things:

- Send additions and corrections to the Software Distribution Database to archie-admin@cs.mcgill.ca.
- Maintain compressed, automated, recursive listings (ls-1R.Z files) on their machines. This lessens network loads and makes life easier for archie. Send queries for specific formats to archie-admin@cs.mcgill.ca. ■

NSF NETWORK NEWS

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